Claims

[c1] RD 28582

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1 .A radiation detector, comprising:

a scintillator which produces UV photons in response to receiving radiation from a radiation producing source; and

a wide bandgap semiconductor device sensitive to the UV photons produced by the scintillator, said semiconductor device producing an electric signal as a function of the amount of UV photons incident thereon.

[c2] *2* .The radiation detector as set forth in claim *1* , wherein the wide bandgap semiconductor device is a SiC, GaN or AlGaN device.

[c3] *3* .The radiation detector as set forth in claim *2* , wherein the semiconductor device is a photodiode or an avalanche photodiode.

[c4] *4* .The radiation detector as set forth in claim *3* , wherein the semiconductor device is an array of photodiodes or avalanche photodiodes.

[c5] *5* .The radiation detector as set forth in claim *1* , wherein the wide bandgap semiconductor device has a dark current less than or equal to about 1.0 pA/cm^2 at about 0.5 VR.

[c6] *6* .The radiation detector as set forth in claim *1* , wherein the wide bandgap semiconductor device includes a bandgap greater than or equal to about 2 eV.

[c7] *7* .The radiation detector as set forth in claim *1* , wherein the wide bandgap semiconductor device includes a bandgap equal to about 3 eV.

[c8] *8* .The radiation detector as set forth in claim *1* , wherein an output of the UV photons from the scintillator substantially matches a responsivity of the wide bandgap semiconductor device.

[c9] *9* .The radiation detector as set forth in claim *1* , wherein the scintillator includes Li_2HfO_3, BaF_2, CsI, CeF_3, $LuAlO_3:Ce^{3+}$, or Lu_3Al_5O

$_{12}$:Pr^{3+}.

[c10] *10*.The radiation detector as set forth in claim *1*, wherein the radiation includes at least one of gamma rays and x-rays.

11.A method of detecting radiation, comprising:

receiving radiation from a source;

producing UV photons in response to the received radiation;

directing the UV photons to a wide bandgap semiconductor device which is sensitive to the UV photons; and

generating an electric signal with the wide bandgap semiconductor device, said signal being a function of the amount of UV photons incident on the semiconductor device.

[c11] *12*.The method of detecting radiation as set forth in claim *11*, further including:

limiting a dark current of the wide bandgap semiconductor device to be less than or equal to about 1.0 pA/cm^2 at about 0.5 VR.

[c12] *13*.The method of detecting radiation as set forth in claim *11*, wherein a bandgap of the wide bandgap semiconductor device is greater than or equal to about 2 eV.

[c13] *14*.The method of detecting radiation as set forth in claim *11*, wherein a bandgap of the wide bandgap semiconductor device is greater than or equal to about 3 eV.

[c14] *15*.The method of detecting radiation as set forth in claim *11*, further including:

substantially matching an output of the UV photons to a responsivity of the wide bandgap semiconductor device.

[c15] *16*.The method of detecting radiation as set forth in claim *11*, wherein the wide bandgap semiconductor device includes SiC, GaN or AlGaN.

[c16] *17*.The method of detecting radiation as set forth in claim *11*, wherein the

UV photons are produces by a scintillator that has the received radiation incident thereon, said scintillator including Li_2HfO_3, BaF_2, CsI, CeF_3, $LuAlO_3:Ce^{3+}$, or $Lu_3Al_5O_{12}:Pr^{3+}$.

[c17] *18*.A system for measuring radiation, comprising:

means for producing a number of UV photons in response to received radiation, said number of UV photons being proportional to a level of the radiation; and

means for producing an electric signal as a function of the number of the UV photons.

[c18] *19*.The system for measuring radiation as set forth in claim *18*, wherein the received radiation is gamma rays or x-rays.

20.The system for measuring radiation as set forth in claim *18*, wherein the means for producing the electric signal includes a wide bandgap semiconductor device sensitive to UV photons.

[c19] *21*.The system for measuring radiation as set forth in claim *18*, wherein the means for producing the number of UV photons includes a scintillator, said scintillator including Li_2HfO_3, BaF_2, CsI, CeF_3, $LuAlO_3:Ce^{3+}$, or $Lu_3Al_5O_{12}:Pr^{3+}$.

[c20] *22*.The system for measuring radiation as set forth in claim *21*, the system further including:

a reflector, said reflector focusing the UV photons from the scintillator onto the means for producing the electric signal.

[c21] *23*.The system for measuring radiation as set forth in claim *18*, wherein the system is incorporated into one of a medical imaging apparatus or an oil exploration drilling apparatus.